Claims

1. A method of producing a film of an yttria-alumina complex oxide, the method comprising the step of:

spraying a mixed powder of powdery materials of yttria and alumina onto a substrate to produce a sprayed film composed of an yttria-alumina complex oxide.

- 2. The method of claim 1, wherein said powdery material of yttria has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.
- 3. The method of claim 1, wherein said powdery material of alumina has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.
- 4. The method of claim 1, comprising the step of subjecting said sprayed film to a heat treatment.
- 5. The method of claim 1, wherein said yttria-alumina complex oxide includes at least garnet phase.
- 6. A film of an yttria-alumina complex oxide, obtained by the method of claim 1.
- 7. The film of claim 6 free from a crack having a length of not smaller than 3 μm and a width of not smaller than 0.1 μm .
- 8. The film of claim 6, wherein said yttria-alumina complex oxide comprises those of garnet and perovskite phases and a ratio YAL(420)/YAG(420) is not lower than 0.05 and not higher than 1.5, provided that said ratio YAL(420)/YAG(420) is the ratio of a peak strength YAL (420) of the (420) plane of said perovskite phase to a

peak strength YAG (420) of the (420) plane of said garnet phase, said peak strengths being measured by X-ray diffraction method.

- 9. A member effective for reducing particle generation and comprising a substrate and a surface layer on said substrate, wherein said surface layer has α calculated according to the following formula of not lower than 50 and not higher than 700, wherein α = (a specific surface area measured by Krypton adsorption method (cm²/g)) × (a thickness of said surface layer (cm)) × (a bulk density of said surface layer (g/cm³)).
- 10. The member of claim 9, wherein said surface layer has an open porosity of not lower than 10 volume percent and not higher than 30 volume percent.
- 11. The member of claim 9, wherein said surface layer has a ratio of an open porosity to a closed porosity (open porosity/closed porosity) of not higher than 10.
- 12. The member of claim 9, wherein said surface layer has a pore diameter of main open pores of 0.05 to 50 μm .
- 13. The member of claim 9, wherein said surface layer has a thickness of not smaller than 50 μm .
- 14. The member of claim 9, wherein said surface layer is made of a material selected from the group consisting of an oxide containing a rare earth element, an oxide containing an alkaline earth element, a carbide, a nitride, a fluoride, a chloride, an alloy, a solid solution thereof and a mixture thereof.
- 15. The member of claim 9, wherein said surface layer is made of a compound containing yttrium.

- 16. The member of claim 15, wherein said surface layer contains an yttriaalumina complex oxide.
- 17. The member of claim 9, wherein said member is to be exposed to a corrosive substance and a material constituting said substrate has an etching rate against said corrosive substance larger than that of a material constituting said surface layer.
- 18. The member of claim 17, wherein said corrosive substance is a halogen gas or a plasma of a halogen gas.
- 19. The substrate of claim 9, wherein said substrate is made of a material selected from the group consisting of alumina, spinel, yttria, zirconia and the complex oxide thereof.
- 20. The member of claim 15, wherein said surface layer is a film made of an yttria-alumina complex oxide, said film being formed by spraying a mixed powder of powdery materials of yttria and alumina on said substrate.
- 21. The member of claim 20, wherein said powdery material of yttria has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.
- 22. The member of claim 20, wherein said powdery material of alumina has a 50 percent mean particle diameter of not smaller than 0.1 μ m and not larger than 100 μ m.
 - 23. The member of claim 20, wherein said film is thermally treated.

- 24. The member of claim 20, wherein said yttria-alumina complex oxide includes at least garnet phase.
- 25. The member of claim 24, wherein said yttria-alumina complex oxide comprises those of garnet and perovskite phases and a ratio YAL(420)/YAG(420) is not lower than 0.05 and not higher than 1.5, provided that said ratio YAL(420)/YAG(420) is the ratio of a peak strength YAL (420) of the (420) plane of said perovskite phase to a peak strength YAG (420) of the (420) plane of said garnet phase, said peak strengths being measured by X-ray diffraction method.